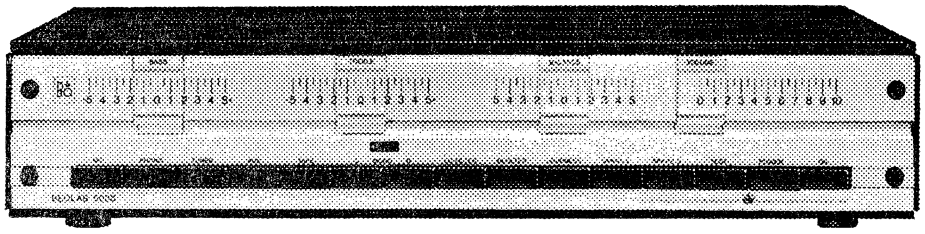
# beolab 5000

type 5303

# SERVICE MANUAL



BANG & OLUFSEN A/S

STRUER - DENMARK Telephone (0 78) 5 11 22* - Telex 4289 - Cable Address Bangoluf

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# TECHNICAL DATA

## DIMENSIONS AND WEIGHT

Dimensions: 47 cm wide, 10 cm high, 25 cm deep
($18\,^{1}/_{2} \times 3\,^{7}/_{8} \times 9\,^{13}/_{16}$ ins.).
Weight: 10.4 kilos (22.88 lb.).

## POWER SUPPLY

110-130-220-240 volts AC, 50-60 c/s.

## POWER CONSUMPTION

45-325 watts.

## POWER OUTPUT

120 watts (2 × 60 watts)
This amount of power is available in the form of a 1 kc/s sine-wave tone for 10 min. with both channels driven simultaneously.
DIN 45500, 6.2.6.

## SPEAKER IMPEDANCE

4Ω (see page 15 for connection of higher impedances).

## FREQUENCY RESPONSE

20-20,000 c/s ± 1.5 dB (for microphone: 40-16,000 c/s ± 1.5 dB).

## DISTORTION

0.2% at 1000 c/s.
0.6% at all frequencies from 20 to 20,000 c/s and power output levels of 60 watts on both channels simultaneously.
Volume control backed 20 dB off from max. setting.

## INTERMODULATION

1% when amplifier is driven to 2 × 60 watts at frequencies of 250 and 8000 c/s at amplitude ratio of 4:1.
DIN 45403, 4.

## SIGNAL-TO-NOISE RATIO

Min. -90 dB below 60 watts with volume control at minimum.
Min. -58 dB below 50 mW at nominal input voltage and with volume control backed off for 50 mW.
DIN 45500, 6.2.5. (for microphone: min. -54 dB below 50 mW).

## CHANNEL SEPARATION

45 dB at 1 kc/s; 30 dB between 250 and 10,000 c/s
DIN 45500, 6.2.4.1.

## INPUT SEPARATION

60 dB at 1 kc/s; 45 dB between 250 and 10,000 c/s
DIN 45500, 6.
Signal-to-noise ratio and input separation were measured at the following input loads:

"MIC": 200Ω.
"PHONO HIGH": 1.5 nF.
"PHONO LOW": Magnetic pick-up, 1200Ω, at 1 kc/s.
"TUNER HIGH": 50 KΩ.
"TUNER LOW": 100 KΩ.
"AUX": 50 KΩ.
"TAPE": 50 KΩ.

Alignment controls set for nominal sensitivities.

Tone controls linear. "LOUDNESS" off.

CHANNEL DIFFERENCE
< 3 dB in range between max. volume and 40 dB below max.

BASS CONTROL
± 17 dB at 50 c/s.

TREBLE CONTROL
± 14 dB at 10 kc/s.

BALANCE CONTROL RANGE
Min. 60 dB.

RUMBLE FILTER
70 c/s, 15 dB per octave.

TREBLE FILTER
6 kc/s, 18 dB per octave.

NUMBER OF TRANSISTORS
47.

The right to alteration of the contents is reserved.

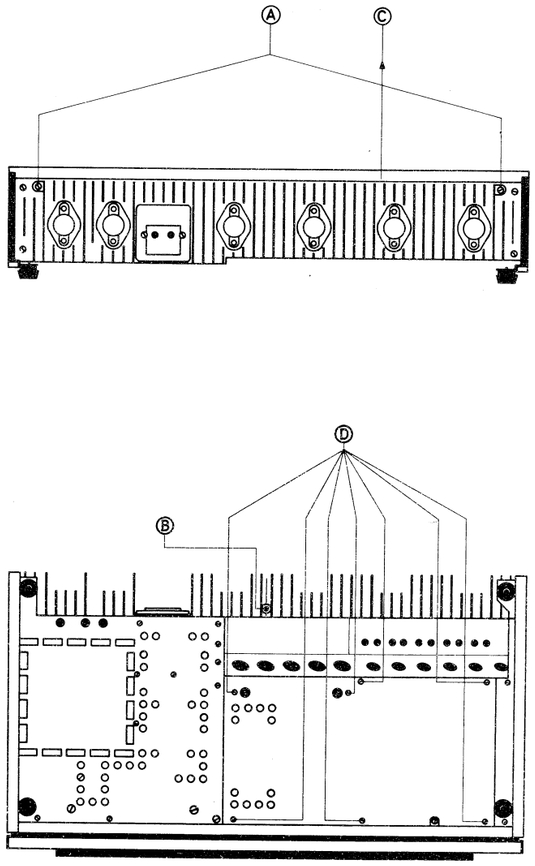
| Input | Application | Curve | Input Impedance 1000 c/s | Nominal [1] input Voltage | Alignment Control Ranges | Max. Input Voltage | Jack |
|---|---|---|---|---|---|---|---|
| MIC | Balanced Input for Microphone | Linear | 200 ohms max. | 200 µV | 150 µV<br>15 mV [2] | 3.5 mV<br>15 mV | DIN |
| PHONO HIGH | Crystal Pickup and Line | Linear | 1 megohm | 250 mV | 200 mV<br>4 V | 5 V<br>5 V | DIN and RCA |
| PHONO LOW | Magnetic Pickup | IEC fine groove | 47 k ohms | 4 mV | 1.3 mV<br>14 mV | 35 mV<br>120 mV | |
| TUNER HIGH | Radio Line | Linear | 470 k ohms | 250 mV | 200 mV<br>4 V | 5 V<br>5 V | DIN and RCA |
| TUNER LOW | Radio | Linear | 47 k ohms | 7 mV | 6 mV<br>200 mV | 180 mV<br>5 V | |
| AUX | Line | Linear | 470 k ohms | 250 mV | 200 mV<br>4 V | 5 V<br>5 V | DIN and RCA |
| TAPE | Tape Recorder | Linear | 470 k ohms | 250 mV | 200 mV<br>7 V [2] | 7 V<br>7 V | DIN and RCA |

[1] Nominal input voltage is the voltage providing full power output with the volume control at max. Technical data are for alignment controls set for nominal input voltages.

[2] May be set for higher voltages, but max. input voltage must not exceed the values listed

| Outputs | Output Impedance | Output Voltage at Nominal Input Voltage | Max. Output Voltage | Jack |
|---|---|---|---|---|
| TAPE | 4 k ohms | 30 mV | 0.9 V | DIN |
| LINE OUT | 4 k ohms | 30 mV | 0.9 V | DIN |
| LINE OUT | 2 k ohms | 350 mV | 7 V | RCA |

# DISASSEMBLY

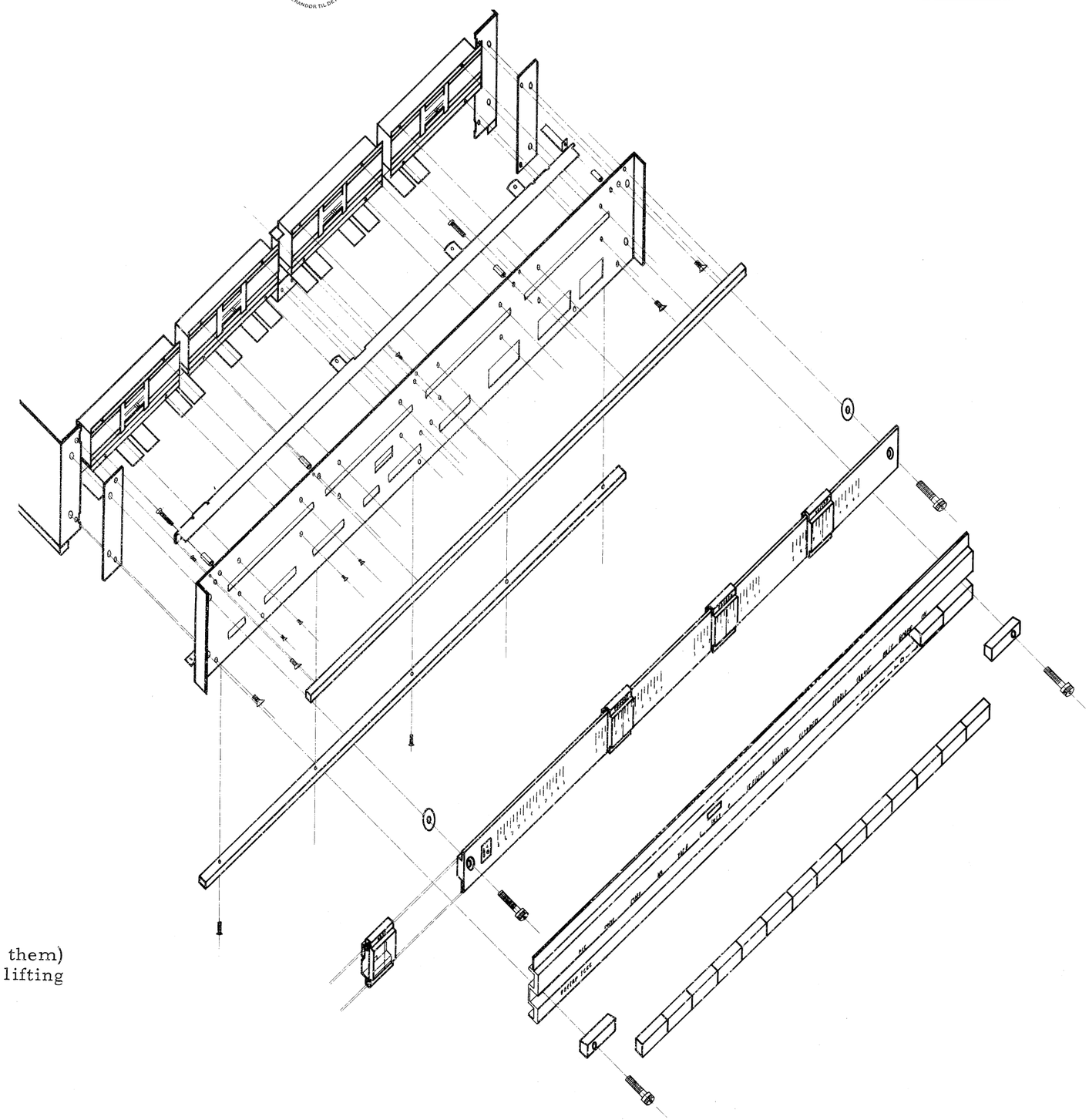



Disassembling the BEOLAB 5000

First loosen the screws marked A (it is not necessary to remove them) Then remove screw B. You can now remove the top section by lifting it in the direction of arrow C.

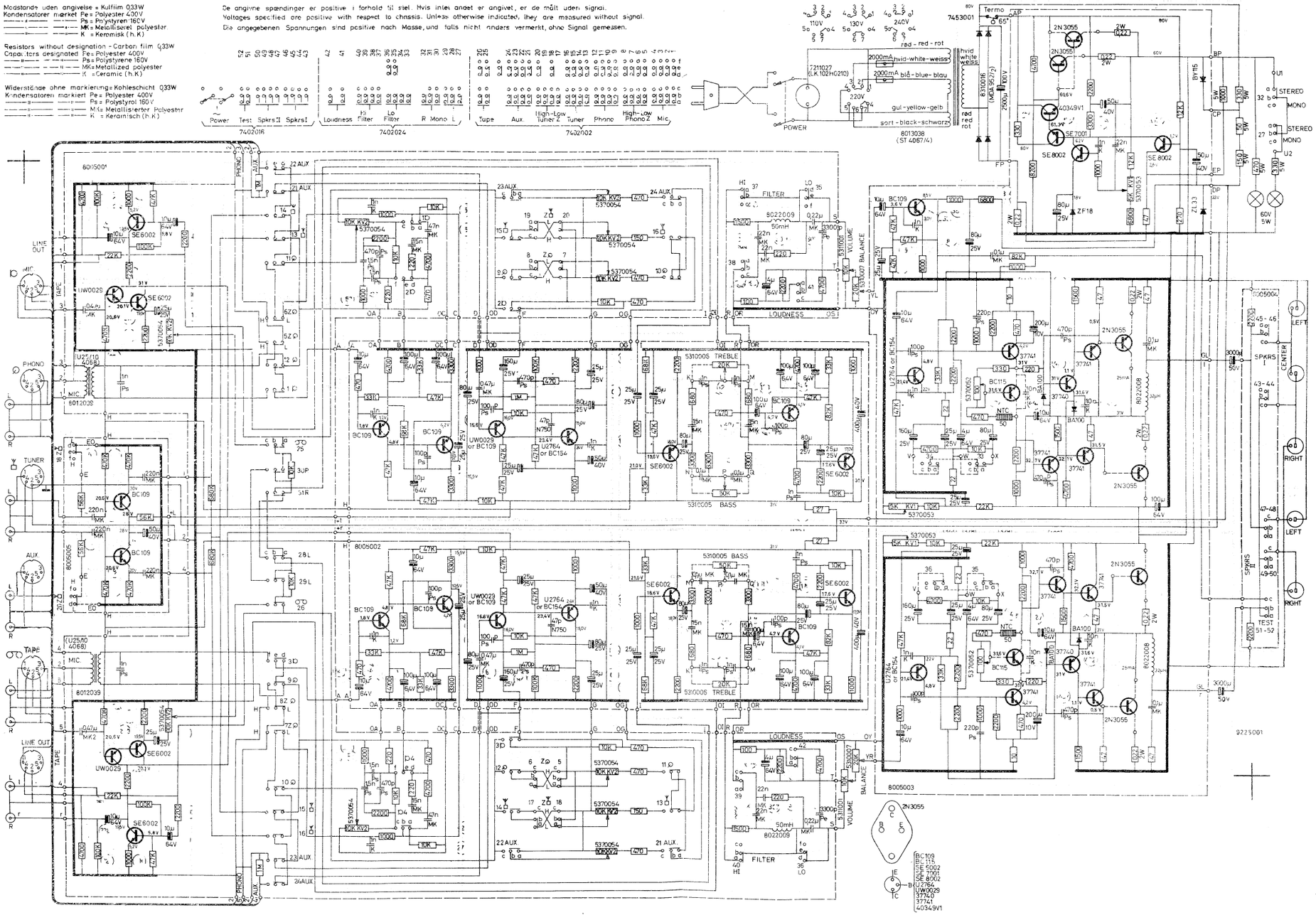
To take off the bottom place, remove the screws marked D.





The front panel with its associated controls is composed of many mechanical parts for which reason it is shown here in a disassembled condition.

# CIRCUIT DIAGRAM OF BEOLAB 5000, Type 5303




In the interests of clarity the wiring from the input sockets was drawn so that the lettering and pin number of each socket is also listed against the pre-amplifier, transformer or switch in question.

# CIRCUIT DIAGRAM OF BEOLAB 5000, Type 5303

Modstande uden angivelse = Kulfilm 0,33W
Kondensatorer mærket Pe = Polyester 400V
Ps = Polystyren 160V
MK = Metalliseret polyester
K = Keramisk (h.K)

Resistors without designation = Carbon film 0,33W
Capacitors designated Pe = Polyester 400V
Ps = Polystyrene 160V
MK = Metallized polyester
K = Ceramic (h.K)

Widerstände ohne markierung = Kohleschicht 0,33W
Kondensatoren markiert Pe = Polyester 400V
Ps = Polystyrol 160V
MK = Metallisierter Polyester
K = Keramisch (h.K)

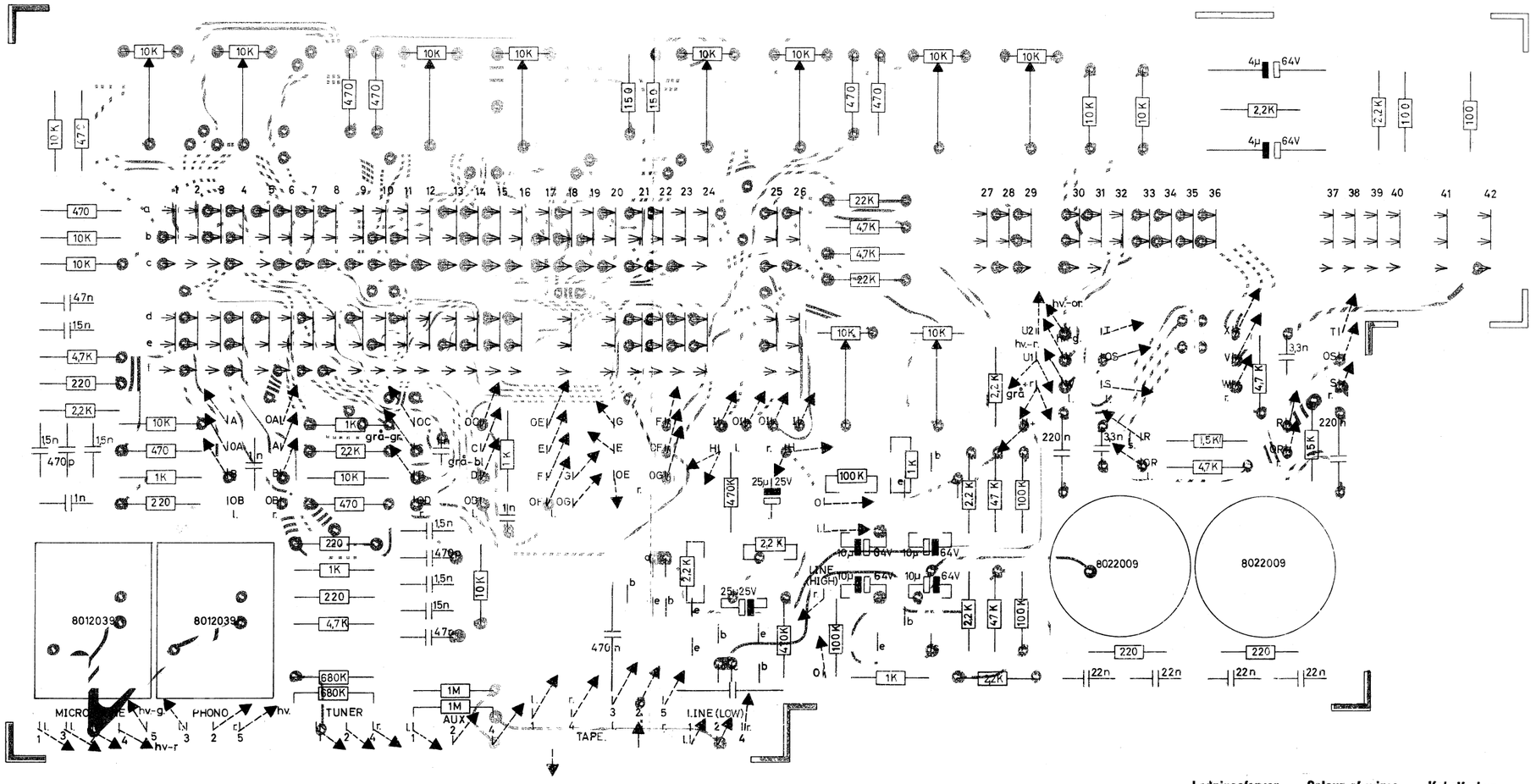
De angivne spændinger er positive i forhold til stel. Hvis intet andet er angivet, er de målt uden signal.
Voltages specified are positive with respect to chassis. Unless otherwise indicated, they are measured without signal.
Die angegebenen Spannungen sind positive nach Masse, und falls nicht anders vermerkt, ohne Signal gemessen.

7402016: Power, Test, Spkrs II, Spkrs I
7402024: Loudness, Hi Filter, Lo Filter, R, Mono, L
7402002: Tape, Aux., High-Low Tuner Z, Tuner, Phono, High-Low Phono Z, Mic

POWER 7211027 (LK 102H0210) 8013038 (ST 4067/4)

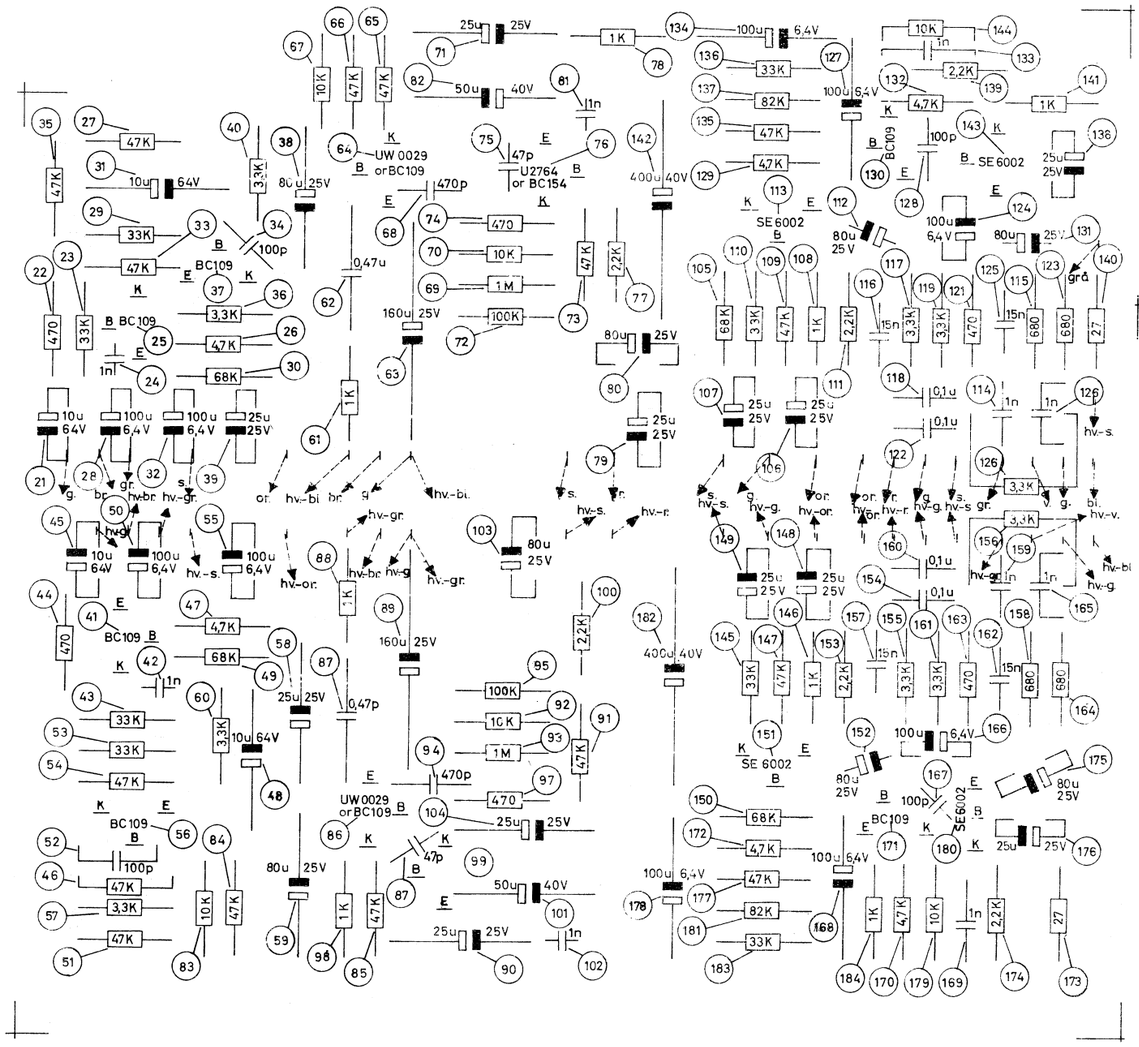
In the interests of clarity the wiring from the input sockets was drawn so that the lettering and pin number of each socket is also listed against the pre-amplifier, transformer or switch in question.

# PW UNIT 8005001

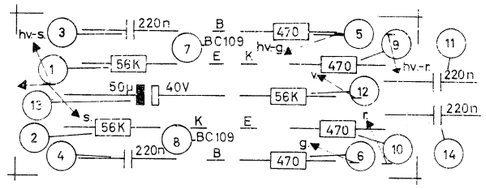



| Ledningsfarver | Colour of wires | Kabelfarben |
|---|---|---|
| bl: blå | blue | blau |
| br: brun | brown | braun |
| g: gul | yellow | gelb |
| gr: grøn | green | grün |
| grå: grå | grey | grau |
| hv: hvid | white | weiss |
| or: orange | orange | orange |
| r: rød | red | rot |
| s: sort | black | schwarz |
| v: violet | violet | violett |

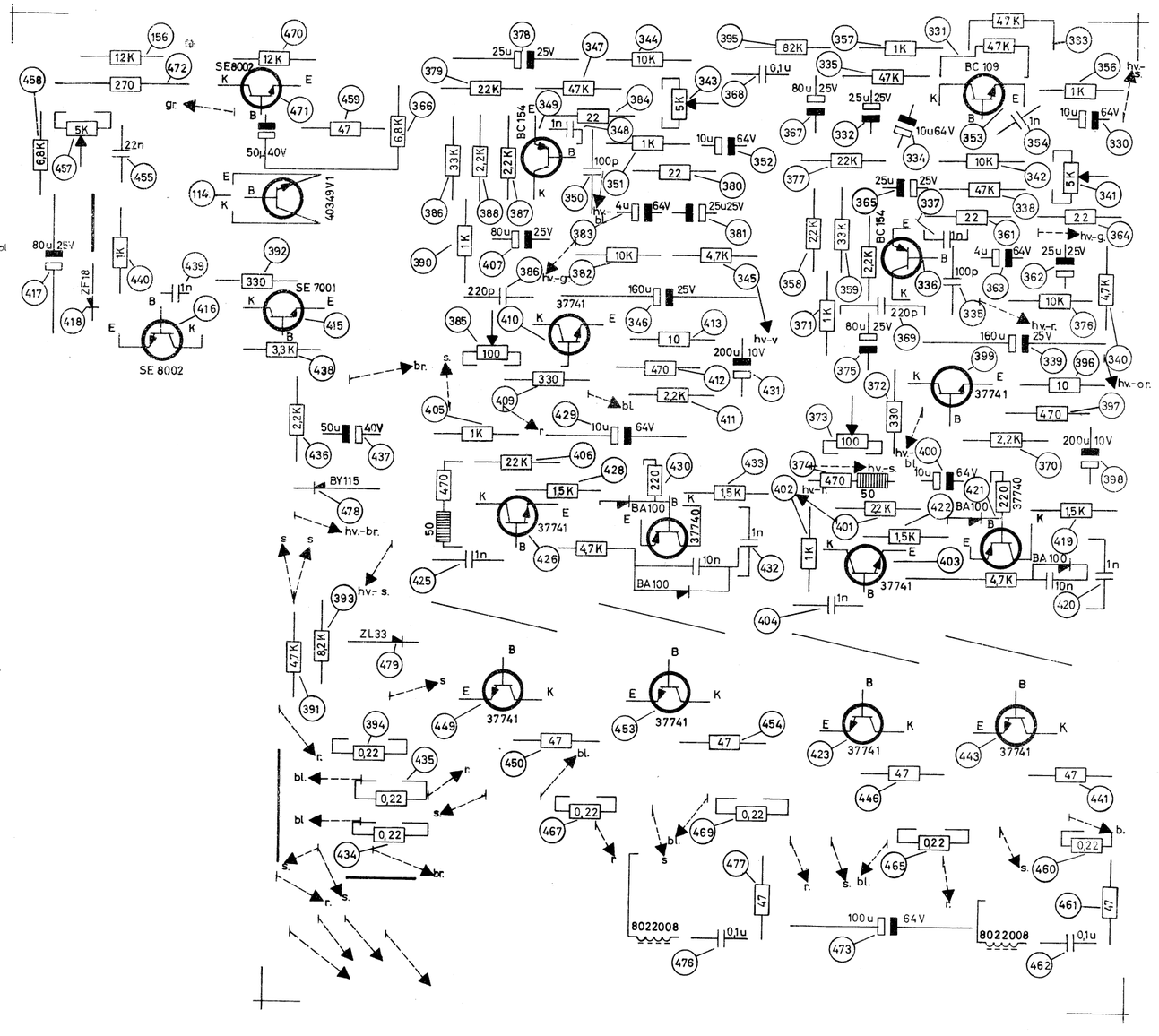
## PW UNIT 8005002



## PW UNIT 8005005

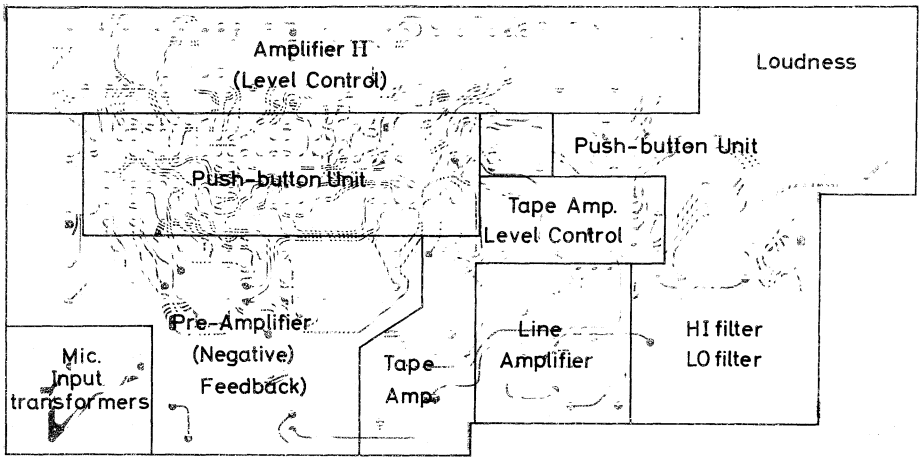


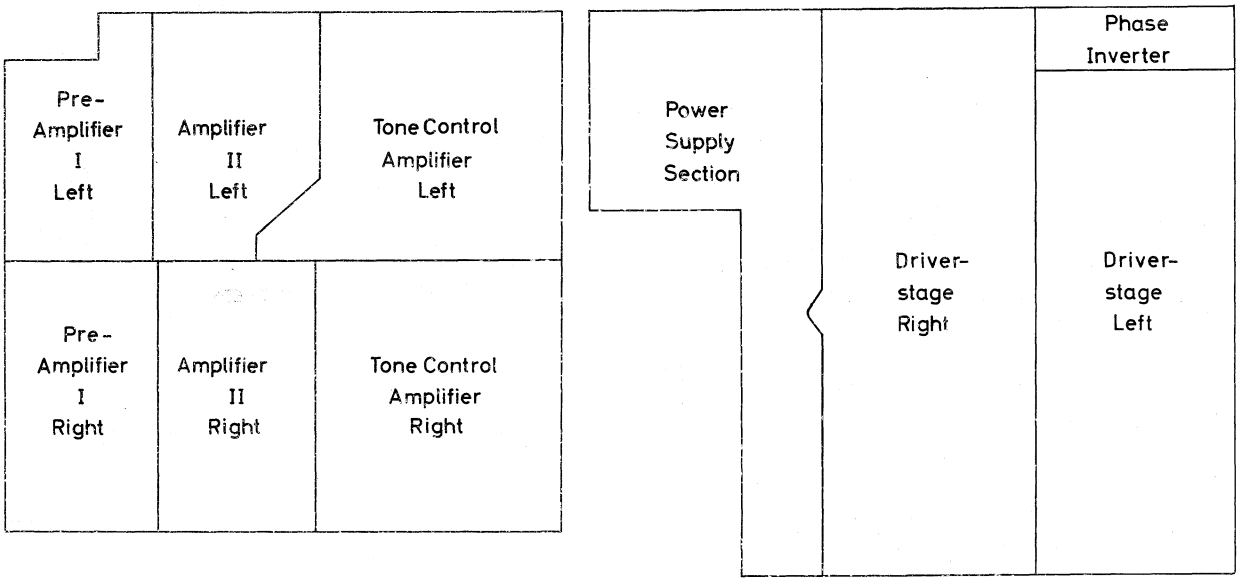
## PW UNIT 8005003

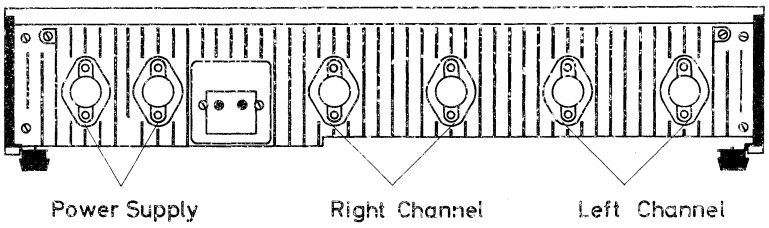


**Ledningsfarver — Colour of wires — Kabelfarben**

| | | | |
|---|---|---|---|
| bl: blå | — | blue | — blau |
| br: brun | — | brown | — braun |
| g: gul | — | yellow | — gelb |
| gr: grøn | — | green | — grün |
| grå: grå | — | grey | — grau |
| hv: hvid | — | white | — weiss |
| or: orange | — | orange | — orange |
| r: rød | — | red | — rot |
| s: sort | — | black | — schwarz |
| v: violet | — | violet | — violett |



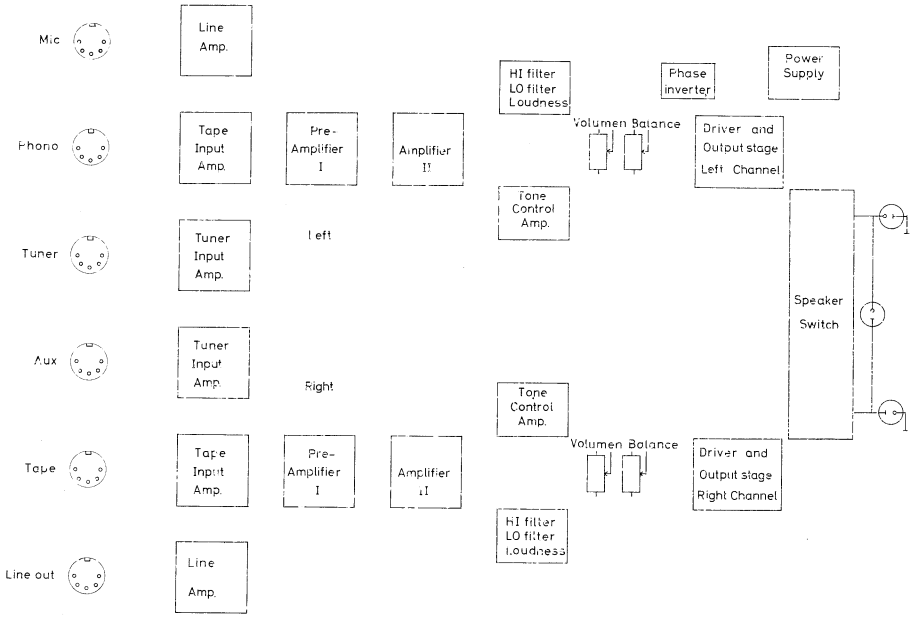




The circuit diagram is divided into amplifier units according to their functions. However, an amplifier unit is not always concentrated on one and the same PW board, being often distributed on several boards. For this reason the layout sketches for the PW units are similarly divided.

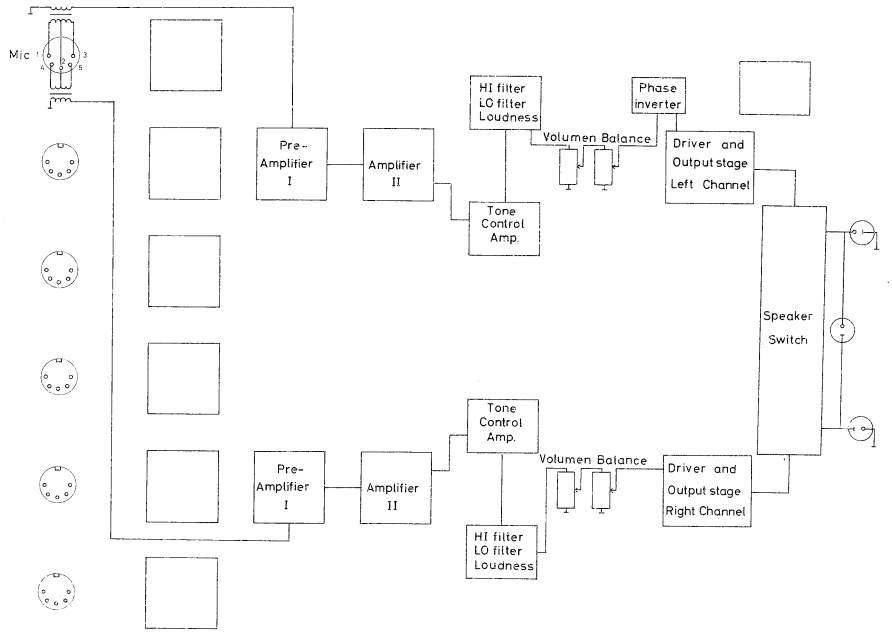
## Description of Functions

The BEOLAB 5000 is an all-transistor audio amplifier with separate input channels.

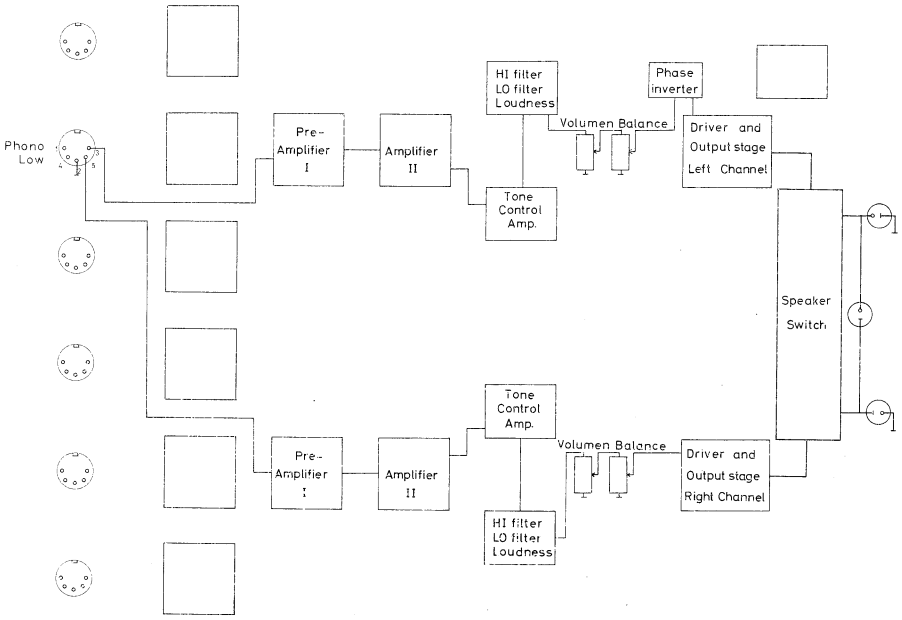


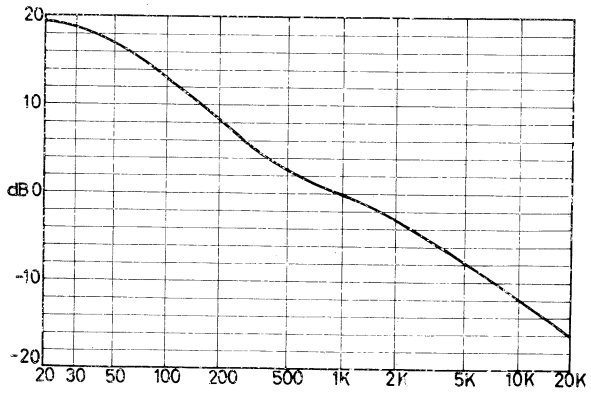

Shown above, as a supplement to the main diagram, is a block diagram in which pre-amplifiers, intermediaste stages, and output stages are similarly located in relation to each other.

The texts and sketches below explain the signal path in the various functions.



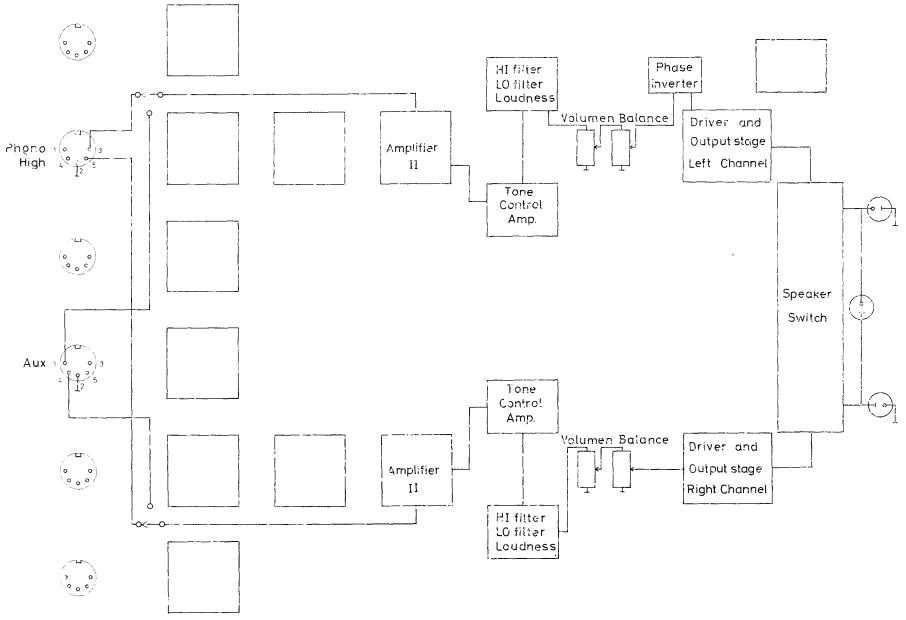

Microphone Input. From the balanced transformers, the signal is fed to pre-amplifier I, in which level adjustment is performed, Nos. 247 and 267, then follow amplifier II and the tone control amplifier.



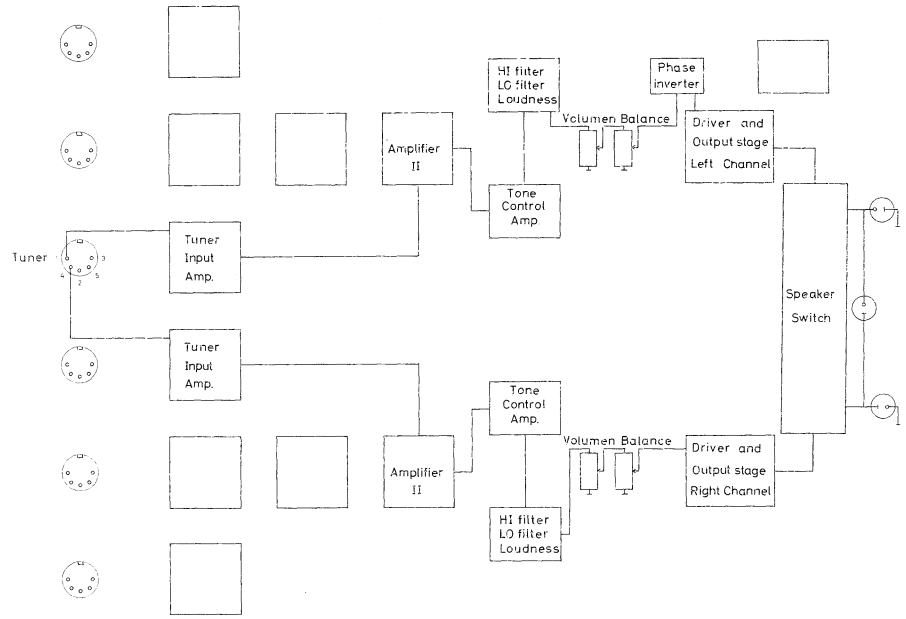




This curve shows de-emphasis applied to the magnetic-pickup input (PHONO LOW).

A low-impedance gramophone signal is also fed to pre-amplifier I in which level control is performed, Nos. 280 and 287, also frequency correction as shown in the curve, by means of Nos. 257 - 261, and 272 - 276.

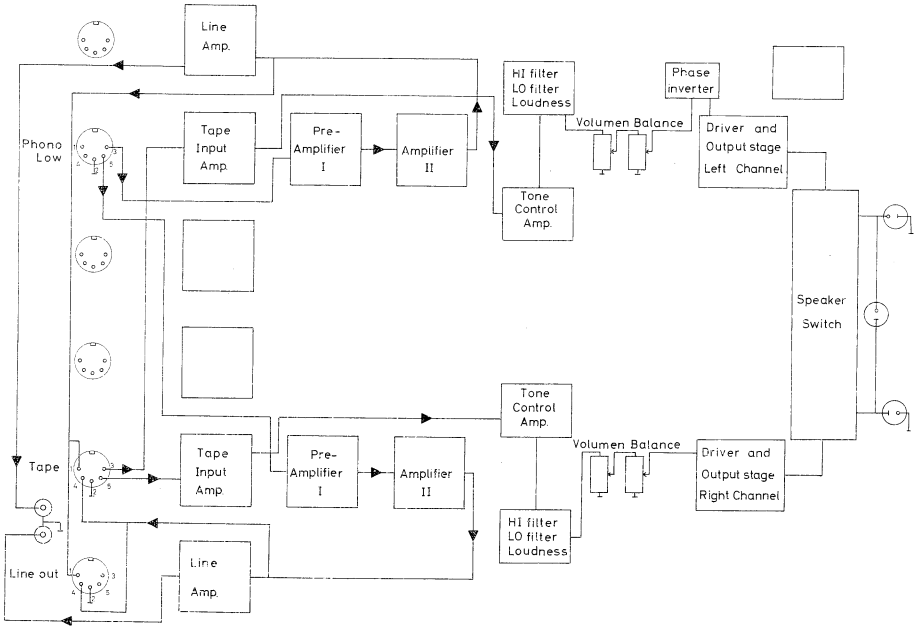



A high-impedance gramophone signal and a signal from the AUX input are fed directly to amplifier II, which has flat frequency response. Level control for gramophone is performed by Nos. 280 and 287 for AUX by Nos. 278 and 289.



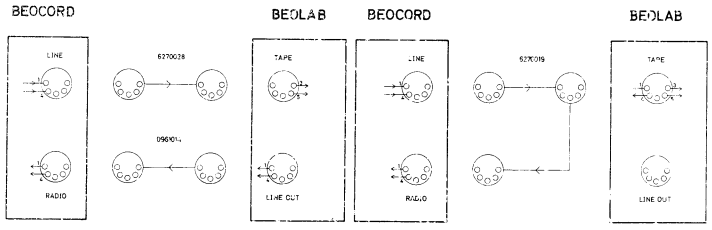

Radio Input. Switching between low signal level, TUNER low, and high level, TUNER HIGH, is performed both in the tuner amplifier (an emitter follower) and in amplifier II, level control Nos. 279 and 288.

Note: Where level control is used both in the LOW and in the HIGH functions, it will appear in the negative-feedback and voltage-divider circuits, respectively, for which reason the direction of rotation is opposite.




BEOCORD, record. Signals are fed from amplifier II to TAPE or LINE OUT, regardless of what signal source is connected.

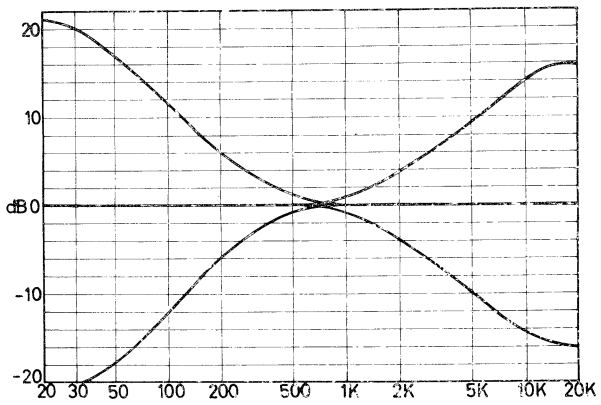
Tape Recorder, playback. The tape pre-amplifier has a two-stage emitter follower, level control Nos. 219 and 235, and signals are passed on to the tone control amplifier unit.



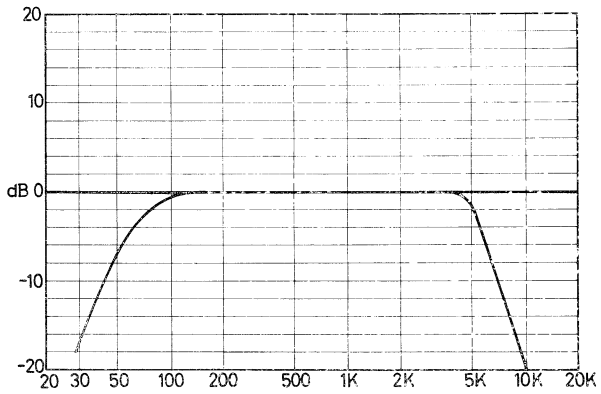

These two functions are consequently independent of each other, permitting off-the-tape monitoring either through two cables (6270028 and 0961014) or a twin cable (6270019).

The LINE OUT (DIN) jack receives signals directly from amplifier II whilst an additional line amplifier stage is inserted for signals from the RCA sockets.

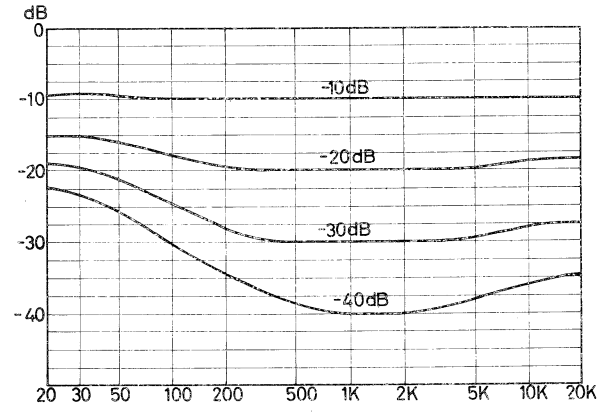
The tone control amplifier comprises bass and treble control, a HI filter (needle talk), LO filter (rumble), and a LOUDNESS control circuit which is a type of physiologically compensated volume control operating both in the bass and in the treble ranges at low volume levels.




Tone control curves showing max. and min. bass and treble settings and flat frequency response




Curves for Hi ang LO filters




Curves for "Loudness" compensation

## Phase Inverter

After having passed the volume and balance controls, the signals could now be fed to the two output stages, which are identical in regard to circuitry and gain. However, a phase inverter inserted in the left channel makes it possible to add up the two output signals and feed them to the same speaker socket (CENTER), leaving the two sets of side speakers correctly polarized. Moreover, more uniform loading of the stabilized power supply is obtained.

## Output Stages

DC coupling is used in all stages and high temperature stability is ensured by a control transistor, BC 115, mounted in the output-transistor heat sink and inserted in the circuit controlling the no-load current.

Two sets of driver transistors are used in order to keep distortion at a negligible level.

The effect of capacitive loads, such as may be introduced by long speaker leads or by crossover networks, is reduced by means of a choke coil (Nos. 463 and 475).

Each output stage has a protective circuit of its own, for which reason a component failure in one channel will not affect the other channel nor the other amplifier units.

Should the speaker impedance connected to the BEOLAB 5000 become too low, the cross current through the transistors will increase, which could eventually cause the stage to run away thermally. Consequently a BA 100 diode, Nos. 451 and 473, has been inserted in the complementary driver stage, in the emitter circuit of 37740. Nos. 421 and 430.

Under normal conditions, the current will flow through the 4700-ohm resistor, Nos. 464 and 466, and thereafter divide between the transistor and the diode with 31.6 volts at the transistor emitter and 0.6 volt across the diode, causing the latter to conduct.

Should the output stage begin to draw more current, the current through the driver stages will increase too. When this current equals the current through the 4700-ohm resistor, the diode will cease to conduct and the current through the driver transistors and also the current through the output transistors will be limited.

The "centre-voltage", normally 31 volts, will increase to approx. 55 volts and the current through the output stage will become lower and constant until the load is normal once more.

In order to protect the blocked 37740 transistor against the signal voltages continually applied from the preceding stages, a BA 101 diode, Nos. 442 and 447, has been inserted at the base of the 37740. This diode performs no function during normal operation but becomes conductive when the emitter diode opens up and bypasses the signal voltages to the 31 volt point.

## Speaker Switch

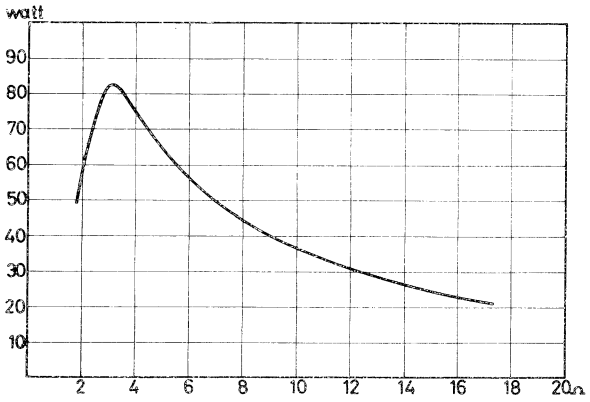
Switching between the two sets of sockets is done in the normal manner except that the right channel is wired with the round contact connected to the chassis whilst it is normal practice to connect the flat contact to the chassis. This balances out the phase difference between the two channels and the centre speaker which operates only in SPKRS 1 will receive the sum of the signals from the two channels.

## Test

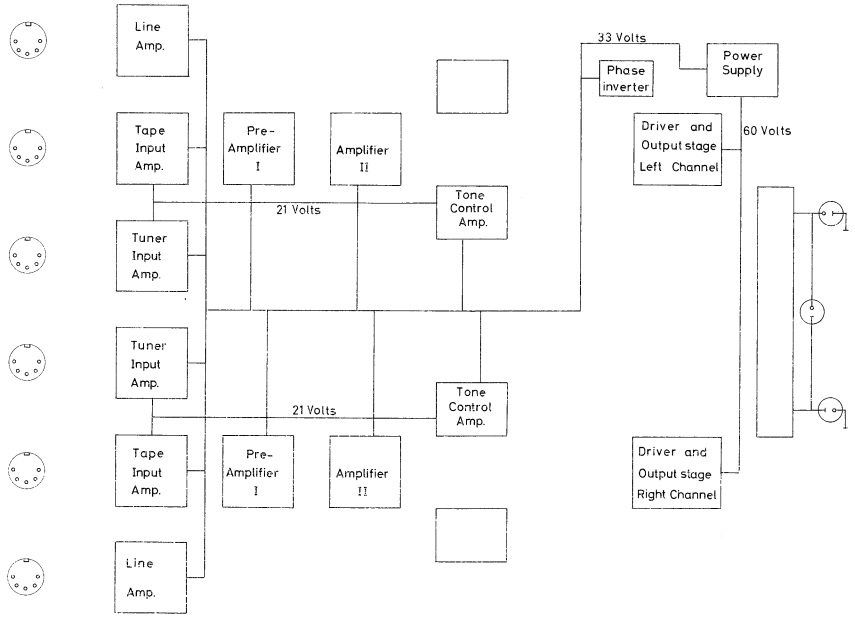
In this function, the output signal for the right-hand set of speakers is switched to pass via an 82 K ohm resistor, No. 395, to the input of the left output amplifier, where it appears as an out-of-phase signal. The resulting minimum signal in the left speakers is used for level adjustments.

| Speakers at Outputs | Speaker Impedance 4) | Power Output |
|---|---|---|
| SPKRS 1 - 2 | 4 ohms | 2 × 60 watts |
| SPKRS 1 - 2 | 8 ohms | 2 × 40 watts |
| SPKRS 1 - 2 | 16 ohms | 2 × 20 watts |
| CENTER only | 8 ohms | 120 watts |

4) Speaker impedance is represented by the parallel connection of the speakers connected at SPKRS 1 and SPKRS 2 (the load imposed on both channels by the centre speaker alone is one-half (4 ohms) of the centre-speaker impedance (8 ohms).
At speaker impedances lower than 3 ohms, power output decreases in direct proportion to the decrease in impedance (electronic protective circuit).



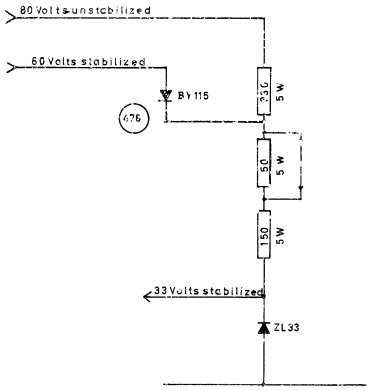

Maximum obtainable output per channel at different speaker impedances.




The power supply is stabilized against both load and mains voltage variations and delivers + 60 volts and + 33 volts.

The power supply uses 6 transistors, one of which, an SE 8002, No. 416, operates as a control transistor comparing the voltage across the ZF 18 zener diode and the + 60 volt output voltage. SE 7001 and 40349 VI operate as a driver for the two 2N30055's, which function as series transistors.

The electronic protective circuit of the power supply is based on an SE 8002 transistor, No. 471. When the current through the 0.22 ohm resistor, No. 394, exceeds approx. 7 amperes, the transistor will begin to conduct and hence reduce the base voltage at the SE 7001, No. 415, and the stabilized 60 volt potential will drop to approx. 1 volt.




The 33 volt potential is taken out from a voltage divider across the 60 volt potential through a BY 115, No. 478, 50 ohms, 150 ohms, and zener diode ZL 33. However, the 33 volt potential will continue to be present even if the 60 volt potential disappears, due to the direct connection, through a 33 ohm resistor, to the rectified 80 volt potential.

The thermal cutout, 7453001, disconnects the 60 volt potential when the ambient temperature exceeds approx. 65°C, such as may happen if the ventilating apertures are covered up. Cut-in occurs automatically when the temperature drops.

Note: The thermal cutout is not a thermistor and consequently will not react to increasing power consumption or to short circuits in the set.

Base Bias

In addition to the 60 and 33 volt supply voltages from the power supply section, a 21 volt potential is fed from the tone control amplifier through point H to serve as base bias for the tuner amplifier and tape pre-amplifier.

## Service Tips

The use of three separate protective circuits - in the power supply, against the overall drain on the 60 volt potential, and in the two output stages, against excessive current through driver and output transistors - greatly facilitates the tracing of faults.

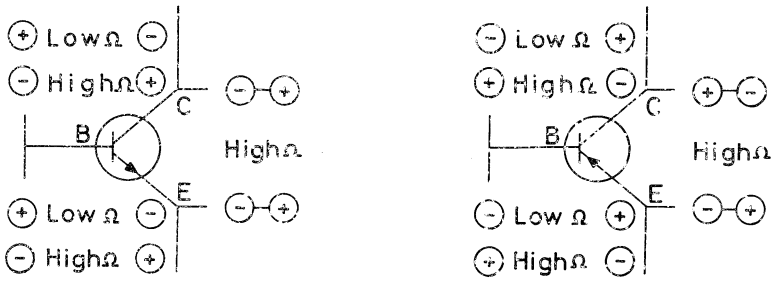
## Voltage Measurements

The diagram on page 5 lists the voltages normally measured on the transistors. Measurements may differ by as much as 20%, due to tolerances. Besides, the small difference between emitter and base voltages is sometimes difficult to read with conventional meters. As a rule the voltage between the base and emitter will be 0.6 volt regardless of the voltage with respect to the chassis.

## Measuring with an Ohmmeter (mains voltage switched off)

In addition to voltage and current measurements it is possible to use an ohmmeter, without having previously unsoldered transistors. However, it should be noted that, in the case of driver and output transistors, resistance values are so low that it may be necessary to unsolder the transistors.

Since readings will depend on the internal resistance of the meter, it will not be practical to list actual ohm values. It is better to check the difference between the backward and forward directions by measuring directly on the transistors and by reversing the meter leads.




**NPN** **PNP**

It will appear from the sketch above that measurements on an NPN transistor in the forward direction, with the plus lead of the meter connected to the base and the minus lead connected to the collector or emitter, will give low ohm readings. Measurements in the backward direction, with the minus lead connected to the base and the plus lead connected to the collector or emitter, will produce considerably higher ohm readings. Measurements between the collector and emitter will give high ohm readings both in the backward and in the forward direction.

The ohm x 1 range should be used as a general rule.

Polarizations listed in the sketch apply to the battery supply incorporated in the ohmmeter.

Note: In some types of multimeter, this polarization is the reverse of that applying to voltage measurement.

The most frequent faults are short circuits between the collector and emitter and open circuits between the base and emitter. These faults can often be traced to a preceding transistor on account of the DC coupling, for which reason check measurements should be made all the way to the first coupling capacitor.

When tracing faults in one of the output stages, it is a good idea to make comparative measurements, both resistance and voltage in the output stage which is performing normally.

The four output transistors and the power transistors in the power supply, 2N3055, are insulated from the cooling element by mica sheets. In order to obtain efficient heat dissipation and prevent voltage flash-over, a thin layer of silicone compound has been applied to all surfaces of contact. This compound comes in tubes, which may be ordered under number DP 2623.

## Test Certificate

The individual test certificate is drawn up in connection with the final testing of the BEOLAB 5000, using the following measuring instruments:

Radiometer Beat Frequency Oscillator, type HO 32

Hewlett Packard Distortion Analyzer, type 333A

Philips Oscilloscope, type PM 3230

Minor deviations may occur after replacement of transistors or other components and after adjustment of current and supply voltages but will hardly be of any importance in practice.

A new test certificate can be made out if desired, in which case the set should be sent to the factory.

Measurements and adjustments should be checked according to the chart below and in the order listed, step by step

| Nature of Measurement | Instrument | Point of Measurement | Adjustement | Remarks | Adjust for |
|---|---|---|---|---|---|
| 60 volts stabilized | Voltmeter Variable Transformer with load meter | BP | Potentiometer No. 457 | Advance transformer control slowly. Current drain should not exceed approx. 0.5 A | + 60 volts |
| 33 volts stabilized | Voltmeter | DP | At zener voltages under 33 V open short circuit across 50Ω<br>At zener voltages over 33 V short-circuit 50Ω | Only after replacement of ZL 33 | |
| No-load current Right | Milliammeter | Insert in series with resistor No. 469 | Potentiometer No. 385 | With volume control at minimum and no load connected to speaker output | 25 mA |
| No-load current Left | Milliammeter | Insert in series with resistor No. 460 | Potentiometer No. 373 | | |
| Symmetry Right | Voltmeter | Emitter of transistor No. 410 | Potentiometer No. 343 | With volume control at minimum and 4-ohm speaker load.<br>May also be adjusted at max. power output at 1000 kc/s sine-wawe signal and 4-ohm speaker load.<br>Using an oscilloscope, adjust for min. symmetrical clipping. | 4.2 volts |
| Symmetry Links | Voltmeter | Emitter of transistor No. 399 | Potentiometer No. 341 | | |

BEOLAB PARTS LIST

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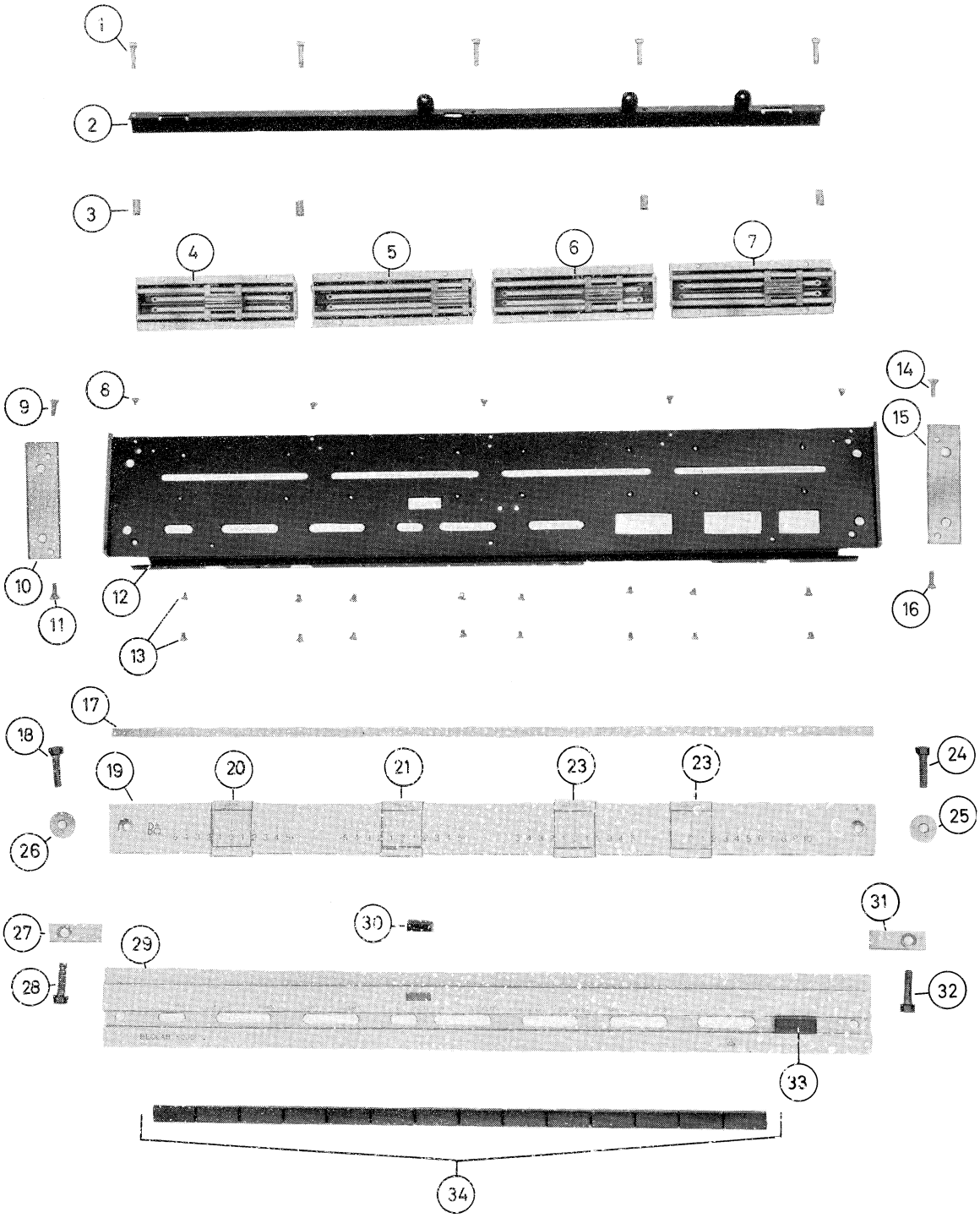
|---|---|---|---|
| 1 | Screw, AM 3 x DIN 84 | 2038222 | - 5 off |
| 2 | Bracket | 0245768 | |
| 3 | Distance pipe | 2950002 | - 4 off |
| 4 | Potentiometer, bass | 5310005 | |
| 5 | - treble | 5310006 | |
| 6 | - balance | 5310007 | |
| 7 | - volume | 5311001 | |
| 8 | Screw, AM 2 x 4 DIN 63 | 2034001 | - 5 off |
| 9 | Screw, AM 3 x 10 DIN 63 | 3038013 | |
| 10 | Spacer | 0287216 | |
| 11 | Screw, AM 3 x 10 DIN 63 | 2038013 | |
| 12 | Front panel | 0540816 | |
| 13 | Screw, AM 2 x 4 DIN 63 | 2034001 | - 16 off |
| 14 | Screw, AM 3 x 10 DIN 63 | 2038013 | |
| 15 | Spacer | 0287216 | |
| 16 | Screw, AM 3 x 10 DIN 63 | 2038013 | |
| 17 | Edging | 0280496 | |
| 18 | Screw, unbrako M 5 x 20 MC (Allen Screw) | 2044904 | |
| 19 | Profile bar | 0283064 | |
| 20 | Slide, bass | 3190001 | |
| 21 | - treble | 3190002 | |
| 22 | - balance | 3190003 | |
| 23 | - volume | 3190004 | |
| 24 | Screw, unbrako M 5 x 20 MC (Allen screw) | 2044904 | |
| 25 | Washer | 2622054 | |
| 26 | - | 2622054 | |
| 27 | Spacer | 0219039 | |
| 28 | Screw, unbrako M 5 x 20 MC (Allen screw) | 2044904 | |
| 29 | Profile bar | 0283065 | |
| 30 | Stereo plate, green | 3183004 | |
| 31 | Spacer | 0291039 | |
| 32 | Screw, unbrako M 5 x 20 MC (Allen screw) | 2044904 | |
| 33 | Indicator cover | 0521219 | |
| 34 | Knob | 0322345 | - 14 off |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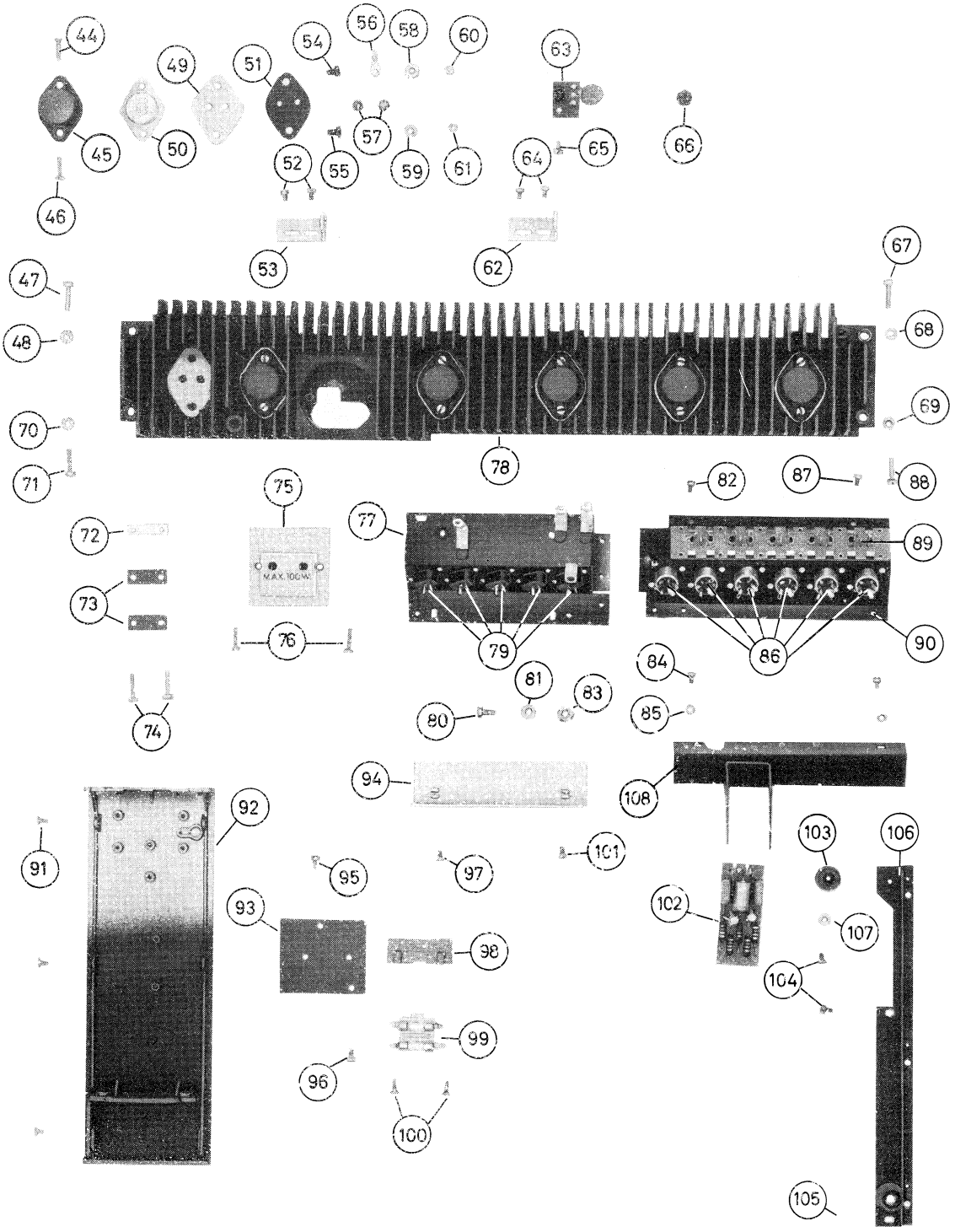
|---|---|---|---|
| 44 | Screw, AM 3 x 14 DIN 63 | 2038019 | |
| 45 | Cover | 0525052 | |
| 46 | Screw, AM 3 x 14 DIN 63 | 2038019 | |
| 47 | Screw, AM 4 x 15 DIN 84 | 2042214 | |
| 48 | Tooth-lock washer | 2625003 | |
| 49 | Shim | 2641005 | |
| 50 | Transistor, 2 N 3055 | 8320061 | - 6 off |
| 51 | Mica insert | 3170002 | |
| 52 | Screw, AM 3 x 5 DIN 84 | 2038208 | |
| 53 | Bracket | 0245762 | |
| 54 | Feedthrough | 2938018 | |
| 55 | - | 2938018 | |
| 56 | Soldering tag | 7530005 | |
| 57 | Fibre washer | 0376436 | |
| 58 | Tooth-lock washer | 2625007 | |
| 59 | - - - | 2625007 | |
| 60 | Nut | 2380011 | |
| 61 | - | 2380011 | |
| 62 | Bracket | 0245762 | |
| 63 | Mounting plate | 3120057 | |
| 64 | Screw, AM 3 x 5 DIN 84 | 2038208 | |
| 65 | Screw, AM 3 x 6 DIN 84 | 2038247 | |
| 66 | Cap nut | 2384003 | |
| 67 | Screw, AM 4 x 15 DIN 84 | 2042214 | |
| 68 | Tooth-lock washer | 2625003 | |
| 69 | - - - | 2625003 | |
| 70 | - - - | 2625003 | |
| 71 | Screw, AM 4 x 15 DIN 84 | 2042214 | |
| 72 | Clamp | 2643001 | |
| 73 | Wire holder | 0287155 | |
| 74 | Screw, AM x3 x 16 DIN 84 | 2038227 | |
| 75 | Power connector | 7211030 | |
| 76 | Screw, AM 3 x 14 DIN 63 | 2038019 | |
| 77 | Mounting plate | 3124016 | |
| 78 | Heat sink | 0275006 | |
| 79 | Speaker sockets | 7211016 | |
| 80 | Screw, AM 4 x 8 DIN 84 | 2042207 | |
| 81 | Washer | 2622022 | |
| 82 | Screw, AM 3 x 5 DIN 84 | 2038208 | |
| 83 | Lock washer | 2627001 | |
| 84 | Screw, AM 3 x 5 DIN 84 | 2038208 | - 2 off |
| 85 | Lock washer | 2625002 | - 2 off |
| 86 | DIN jack, 5 - contact | 7212007 | |
| 87 | Screw, AM 3 x 5 DIN 84 | 2038208 | |
| 88 | Screw, AM 4 x 15 DIN 84 | 2042214 | |
| 89 | Jack panel | 7219007 | |
| 90 | Mounting plate | 3124015 | |
| 91 | Screw, AM 3 x 6 DIN 63 | 2038007 | - 3 off |
| 92 | Side piece | 0540781 | |
| 93 | Insulating piece | 0530640 | |
| 94 | Bracket | 0246772 | |
| 95 | Screw, AM 3 x 6 DIN 84 | 2038247 | |
| 96 | Screw, AM 3 x 6 DIN 84 | 2038247 | |
| 97 | Screw, AM 3 x 5 DIN 84 | 2038208 | |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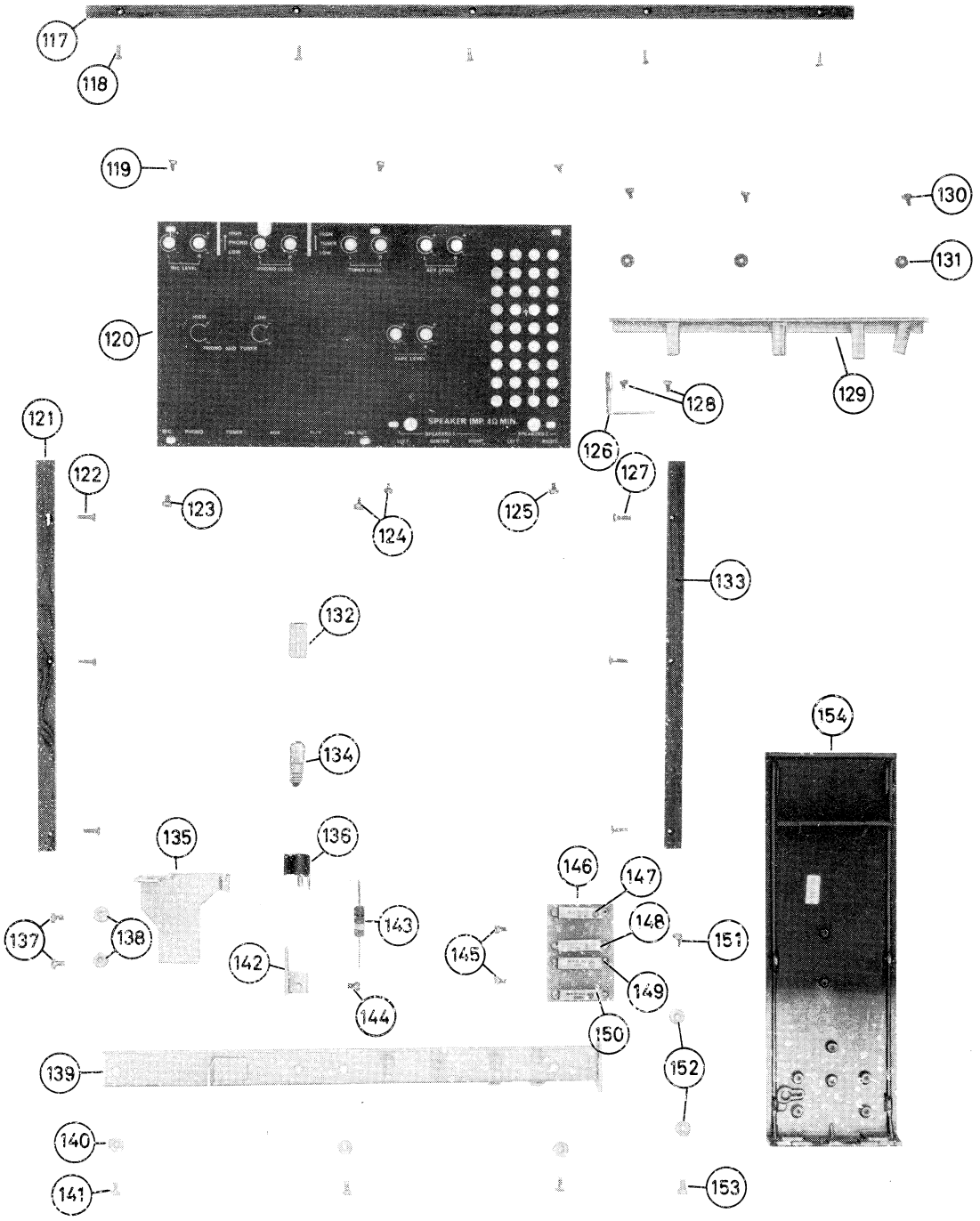
|---|---|---|---|
| 98 | Insulating piece | 0530631 | |
| 99 | Fuse holder | 7202002 | |
| | Fuse, 2 A 250 V | 6600009 | |
| 100 | Screw, B 2.9 x 9.5 DIN 7983 | 2013004 | |
| 101 | Screw, AM 3 x 5 DIN 84 | 2038208 | |
| 102 | Radio input, PW board complete | 8005005 | |
| 103 | Rubber fot, slide shoe | 3035003 | |
| 104 | Screw, AM 3 x 5 DIN 84 | 2038208 | |
| 105 | Screw, AM 3 x 5 DIN 84 | 2038208 | |
| 106 | Side bracket | 0238113 | |
| 107 | Washer | 2622016 | |
| 108 | Bracket | 2530014 | |
| 117 | Edging | 3410030 | |
| 118 | Screw, AM 2 x 8 DIN 63 | 2034014 | - 5 off |
| 119 | Screw, AM 3 x 5 DIN 84 | 2038208 | - 3 off |
| 120 | Bottom plate | 3454003 | |
| 121 | Edging, right-hand | 3410050 | |
| 122 | Screw, AM 2 x 10 DIN 63 | 2034019 | - 3 off |
| 123 | Screw, AM 3 x 5 DIN 84 | 2038208 | |
| 124 | Screw, AM 3 x 5 DIN 84 | 2038208 | |
| 125 | Screw, AM 3 x 5 DIN 84 | 2038208 | |
| 126 | Bracket | 0245763 | |
| 127 | Screw, AM 2 x 10 DIN 63 | 2034019 | - 3 off |
| 128 | Screw, AM 3 x 5 DIN 84 | 2038208 | |
| 129 | Bracket | 2530002 | |
| 130 | Screw, AM 3 x 5 DIN 84 | 2038208 | - 3 off |
| 131 | Fibre washer | 0376165 | - 3 off |
| 132 | Shade | 3302042 | |
| 133 | Edging, left-hand | 3410040 | |
| 134 | Dial lamp, 60 V 5 W KRL | 8230013 | |
| 135 | Bracket | 0238106 | |
| 136 | Dial lamp socket | 7201002 | |
| 137 | Screw, AM 3 x 6 DIN 84 | 2038247 | |
| 138 | Lock washer | 2625007 | |
| 139 | Bracket | 0238108 | |
| 140 | Lockwasher | 2625007 | |
| 141 | Screw, AM 3 x 6 DIN 84 | 2038247 | - 3 off |
| 142 | Bracket for dial lamp | 0245758 | |
| 143 | Resistor, 330 ohms - 16025 | 5105012 | |
| 144 | Screw, AM 3 x DIN 84 | 2038208 | |
| 145 | Screw, AM 3 x 5 DIN 84 | 2038208 | |
| 146 | Mounting plate | 3120068 | |
| 147 | Resistor, 1000 ohms - 16025 | 5105020 | |
| 148 | Resistor, 50 ohms - 16025 | 5105021 | |
| 149 | Resistor, 150 ohms - 16025 | 5105022 | |
| 150 | Resistor, 330 ohms - 16025 | 5105012 | |
| 151 | Screw, AM 3 x 6 DIN 84 | 2038247 | |
| 152 | Lock Washer | 2625003 | |
| 153 | Screw, AM 3 x 6 DIN 84 | 2032847 | |
| 154 | Side piece | 0540781 | |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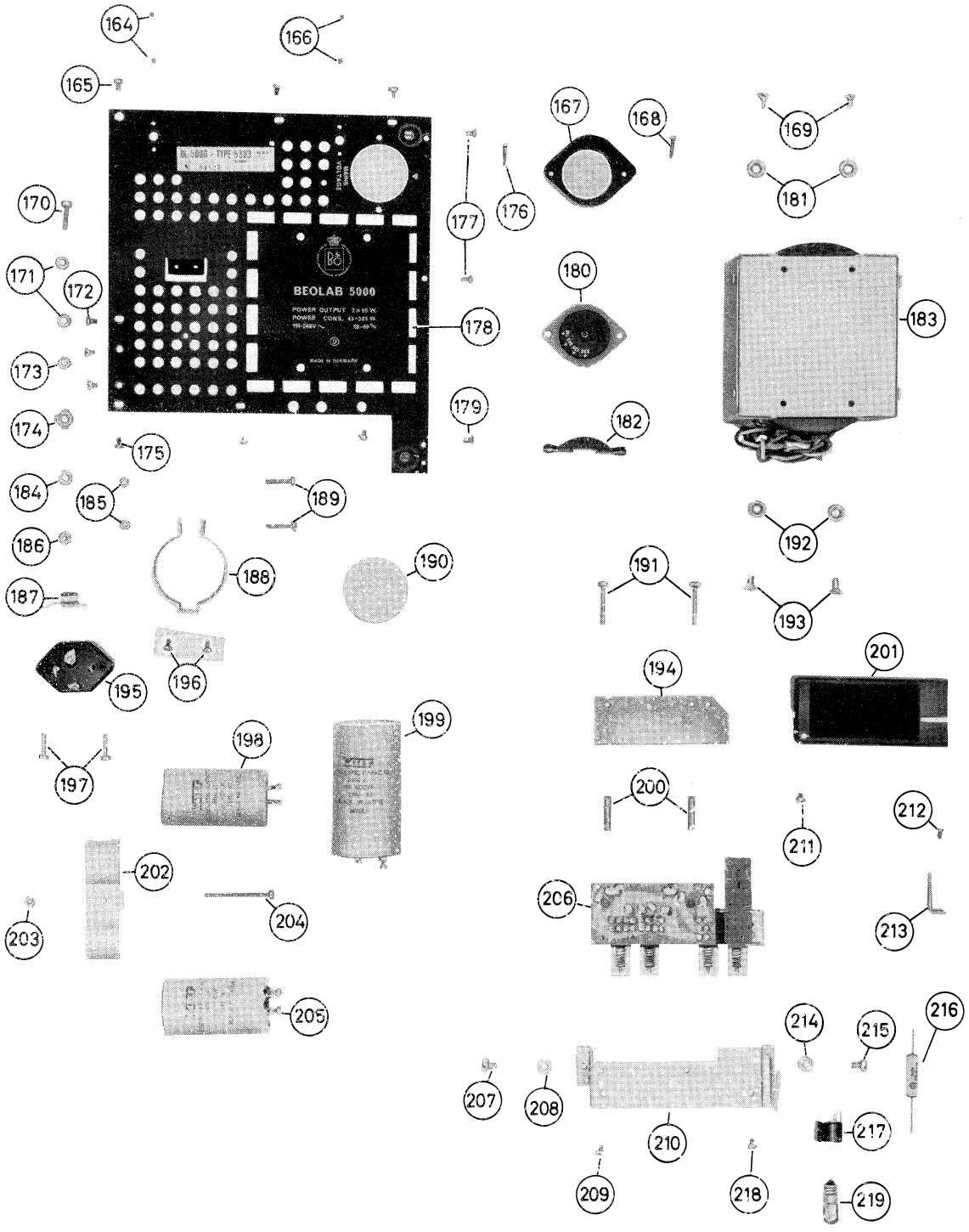
|---|---|---|---|
| 164 | Screw | 2072700 | |
| 165 | Screw, AM 3 x 5 DIN 84 | 2038208 | - 2 off |
| 166 | Screw | 2072700 | |
| 167 | Cover | 0534106 | |
| 168 | Screw, B 2.9 x 16 DIN 7981 | 2013205 | |
| 169 | Screw, AM 4 x 8 DIN 63 | 2042017 | |
| 170 | Screw, AM 4 x 15 DIN 84 | 2042214 | |
| 171 | Lock washer | 2625003 | |
| 172 | Screw, AM 3 x 5 DIN 84 | 2038208 | - 3 off |
| 174 | Lock washer | 2627001 | |
| 175 | Screw, AM 3 x 5 DIN 84 | 2038208 | - 3 off |
| 176 | Screw, B 2.9 x 16 DIN 7981 | 2013205 | |
| 177 | Screw, AM 3 x 6 DIN 63 | 2038007 | |
| 178 | Mounting plate | 3212001 | |
| 179 | Screw, AM 3 x 6 DIN 63 | 2038007 | |
| 180 | Voltage switch | 7401001 | |
| 181 | Washer | 2623011 | |
| 182 | Clamp | 0288045 | |
| 183 | Power transformer | 8013038 | |
| 184 | Washer | 2622022 | |
| 185 | Nut | 2380011 | |
| 186 | Nut | 2380016 | |
| 187 | Capacitor, 100 nF 250 V | 4133001 | |
| 188 | Strap | 0240336 | |
| 189 | Screw, AM 3 x 16 DIN 84 | 2038227 | |
| 190 | Asbestos washer | 3170005 | |
| 191 | Screw, AM 3 x 25 DIN 84 | 2038235 | |
| 192 | Washer | 2623011 | |
| 193 | Screw, AM 4 x 8 DIN 63 | 2042017 | |
| 194 | Cover plate | 3302009 | |
| 195 | Rectifier | 8310016 | |
| 196 | Screw, AM 3 x 5 DIN 84 | 2038208 | |
| 197 | Screw, AM 3 x 14 DIN 84 | 2038222 | |
| 198 | Electrolytic capacitor, 3000 µF/50 V | 4201062 | |
| 199 | Electrolytic capacitor, 2500 µF/100 V | 4202002 | |
| 200 | Distance pipe | 2950003 | |
| 201 | Cover | 3300001 | |
| 202 | Strap | 0240262 | |
| 203 | Nut, 3 MT | 2380011 | |
| 204 | Screw, AM 3 x 40 DIN 84 | 2038241 | |
| 205 | Electrolytic capacitor, 3000µF/50 V | 4201062 | |
| 206 | Push-button switch assembly complete | 8005004 | |
| 207 | Screw, AM 4 x 6 DIN 84 | 2042205 | |
| 208 | Washer | 2622022 | |
| 209 | Screw, AM 3 x 4 DIN 84 | 2038206 | |
| 210 | Bracket | 0240344 | |
| 211 | Screw, AM 3 x 5 DIN 84 | 2038208 | |
| 212 | Screw, AM 3 x 5 DIN 84 | 2038208 | |
| 213 | Bracket | 2530007 | |
| 214 | Washer | 2622022 | |
| 215 | Screw, AM 4 x 6 DIN - | 2042205 | |
| 216 | Resistor, 470 ohms - 16025 | 5105014 | |
| 217 | Socket | 7201002 | |
| 218 | Screw, AM 3 x 4 DIN 84 | 2038206 | |
| 219 | Dial lamp, 60 V 5 W | 8230013 | |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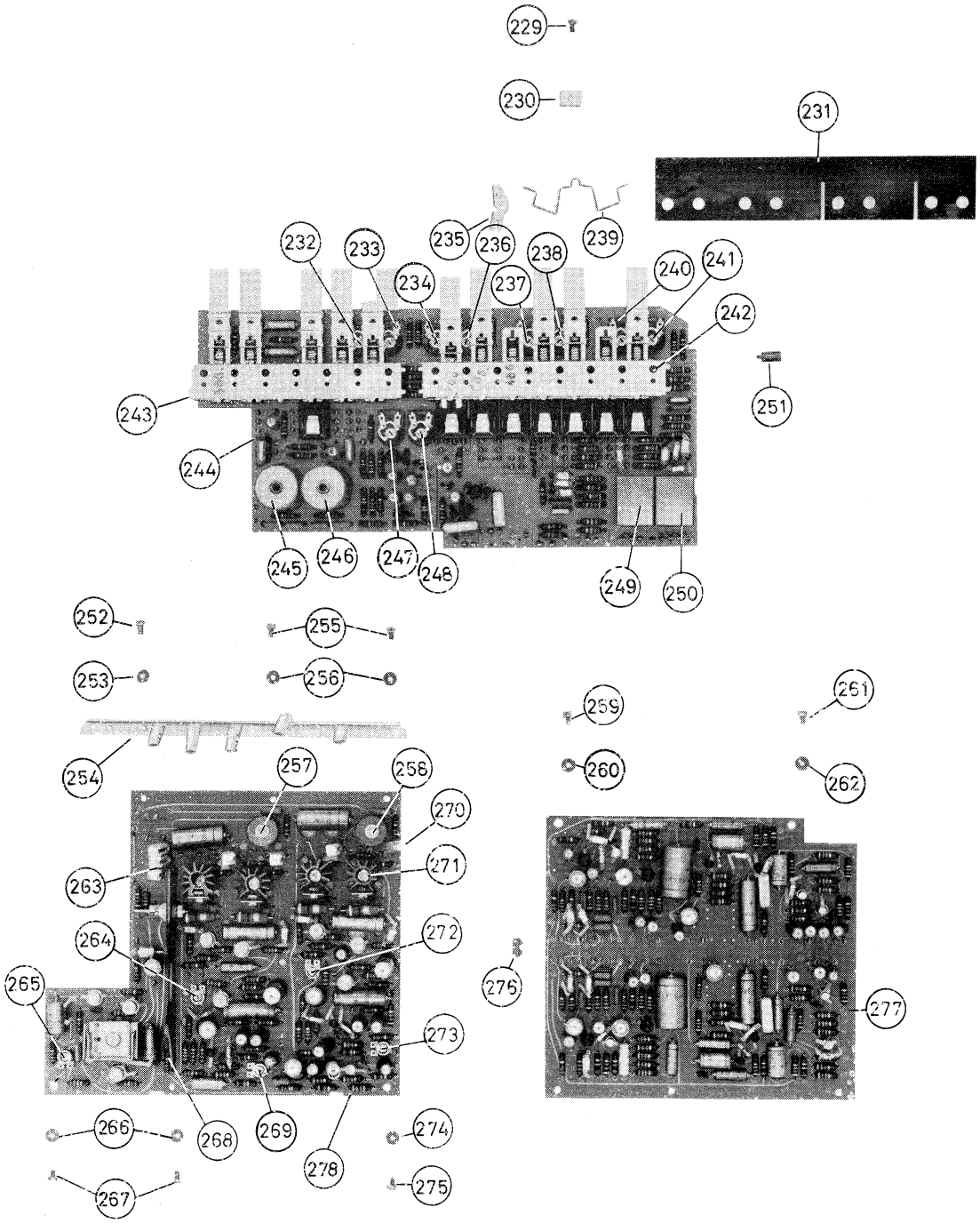
|---|---|---|
| 229 | Screw, AM 3 x 5 DIN 84 | 2038208 |
| 230 | Clamp | 2642002 |
| 231 | Insulating piece | 3170006 |
| 232 | Potentiometer, 10 K ohms | 5370054 |
| 233 | - 10 K ohms | 5370054 |
| 234 | - 10 K ohms | 5370054 |
| 235 | Switch arm for impedance switch | 2854001 |
| 236 | Potentiometer, 10 K ohms | 5370054 |
| 237 | - 10 K ohms | 5370054 |
| 238 | - 10 K ohms | 5370054 |
| 239 | Spring for impedance switch | 2819002 |
| 240 | Potentiometer, 10 K ohms | 5370054 |
| 241 | - 10 K ohms | 5370054 |
| 242 | Push-button switch assembly | 7402007 |
| 243 | - - - - | 7402024 |
| 244 | PW board complete | 8005001 |
| 245 | Coil, 50 mH | 8022009 |
| 246 | - 50 mH | 8022009 |
| 247 | Potentiometer, 10 K ohms | 5370054 |
| 248 | - 10 K ohms | 5370054 |
| 249 | Input transformer | 8012039 |
| 250 | - - | 8012039 |
| 251 | Shaft for potentiometer | 2830021 |
| 252 | Screw, AM 3 x 6 DIN 84 | 2038247 |
| 253 | Fibre washer | 0376165 |
| 254 | Bracket | 2530003 |
| 255 | Screw, AM 3 x 6 DIN 84 | 2038247 |
| 256 | Fibre washer | 0376165 |
| 257 | Coil | 9012008 |
| 258 | - | 9012008 |
| 259 | Screw, AM 3 x 5 DIN 84 | 2038208 |
| 260 | Fibre washer | 0376165 |
| 261 | Screw, AM 3 x 5 DIN 84 | 2038208 |
| 262 | Fibre washer | 0376165 |
| 263 | Resistor, 0.22 ohm, 5 W | 5103000 |
| 264 | Potentiometer, 100 ohms | 5370052 |
| 265 | - 5 K ohms | 5370053 |
| 266 | Fibre washer | 0376165 |
| 267 | Screw, AM 3 x 5 DIN 84 | 2038208 |
| 268 | Heat sink | 3358001 |
| 269 | Potentiometer, 5 K ohms KVI | 5370053 |
| 270 | Resistor, 0.22 ohm 5 W | 5103000 |
| 271 | Heat sink | 3358003 |
| 272 | Potentiometer, 100 ohms | 5370052 |
| 273 | - 5 K ohms KVI | 5370053 |
| 274 | Fibre washer | 0376165 |
| 275 | Screw, AM 3 x 5 DIN 84 | 2038208 |
| 276 | Spacer | 0469037 |
| 277 | PW board complete | 8005002 |
| 278 | - - - | 8005003 |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Parts Not Photographed:

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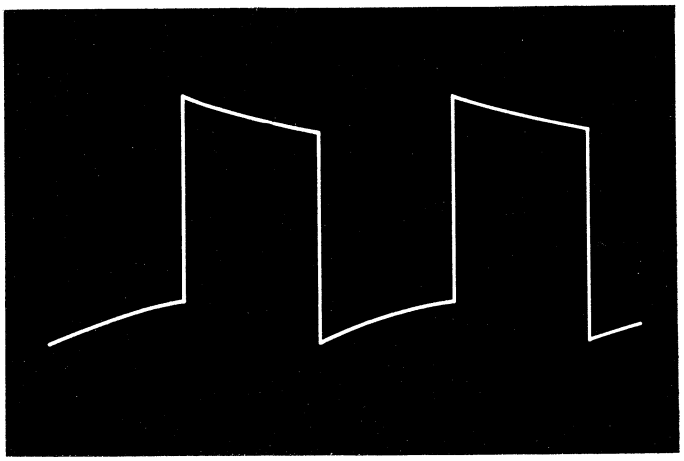
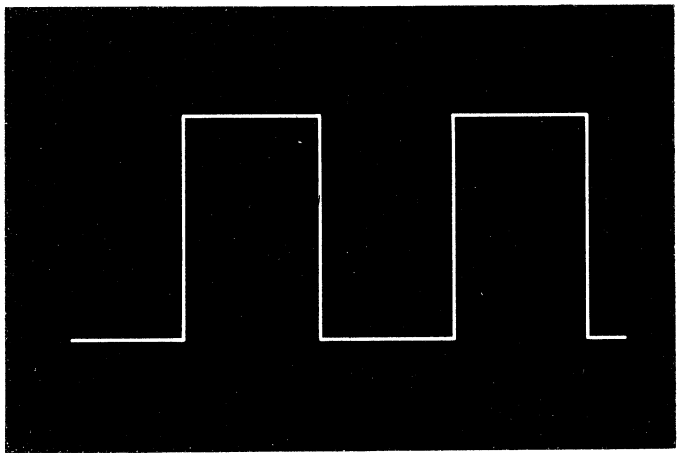
|---|---|
| Holder for heat sink, 3358003 | 3151005 |
| Screw for holder | 2038206 |
| Nut for holder | 2038003 |
| Rubber grommet for potentiometer shaft | 3951012 |
| Lock piece | 2391006 |
| Thermal cutout | 7453001 |
| Insulating piece, small | 3170019 |
| - - large | 3170020 |
| Rubber washers for pre-amplifier | 0286210 |
| Screen near transformer | 3302049 |
| Power connector, Danish | 7221006 |
| - - Swedish | 7211031 |
| - - Europlug with 2.5 m flex | 6271048 |
| Socket Swedish | 7211031 |
| Operating Instructions, Danish | 3505004 |
| - - English | 3505016 |
| Bottom Diagram | 3535001 |
| Transistor, BC 109 | 8320072 |
| - SE 6002 | 8320063 |
| - BC 154 | 8320069 |
| - BC 115 | 8320062 |
| - 37741 | 8320071 |
| - 37740 | 8320070 |
| - 2N3055 | 8320061 |
| - SE 8002 | 8320066 |
| - SE 7001 | 8320073 |
| - 40349 V1 | 8320064 |
| - UW 0029 | 8320047 |
| Diode, BA 100 | 8300015 |

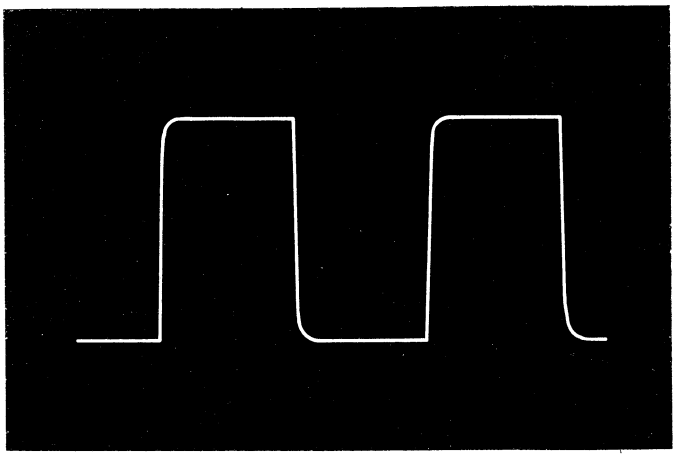
# SQUARE - WAVE CURVES



Square-wave signal at output amplifier, $R_{load}$ = 4 ohms, 100 c/s.



Square-wave signal at output amplifier, $R_{load}$ = 4 ohms, 1000 c/s.



Square-wave signal at output amplifier, $R_{load}$ = 4 ohms, 10000 c/s.

## Modifications

In the first BEOLAB 5000 Type 5303 despatched there was a stereo indicator lamp with a 100 ohm 1 watt resistor. Because it later became apparent that the lamp became overheated with a risk of deforming the holder, the stereo resistor has been changed to 330 ohm 5 watt, Order No. 5105012, together with an attachement Nr. 2510050.

Transistor UW 0029, diagram pos. No. 64, 86, 206 and 224, has been changed to BC 109 B, Order No. 8320114.

Transistor 37741, diagram pos. No. 423, 443, 449 and 453 is changed to 38647, Order No. 8320115.

## Ventilation

Under normal conditions and under service, it must be observed that the air circulation is not hindered by covering the ventilation openings. The equipment must not be placed where the top would be too tightly covered. This also applies when the cover has been removed.

## Speaker Connection

As a consequence of the special coupling of the socket for the centre speaker and the resulting polarization of the four other speaker sockets, the wiring for the connected speakers must be separated.

Therefore, speaker arrangements with common zero must not be used.

## N O T E S: